# United States Patent

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[54] **TESTING DEVICE AND GAME**
**8 Claims, 6 Drawing Figs.**


[52] **U.S. Cl.** ..... **128/2,** 46/43, 273/1, 273/86, 273/129
[51] **Int. Cl.** ..... **A61b 5/16,** A63b 67/00, A63f 9/14
[50] **Field of Search** ..... 46/43; 273/86(3), 86(2); 128/2, 76.5, 77; 273/1 (Inquired); 351/1—4, 32; 351/1—4, 32



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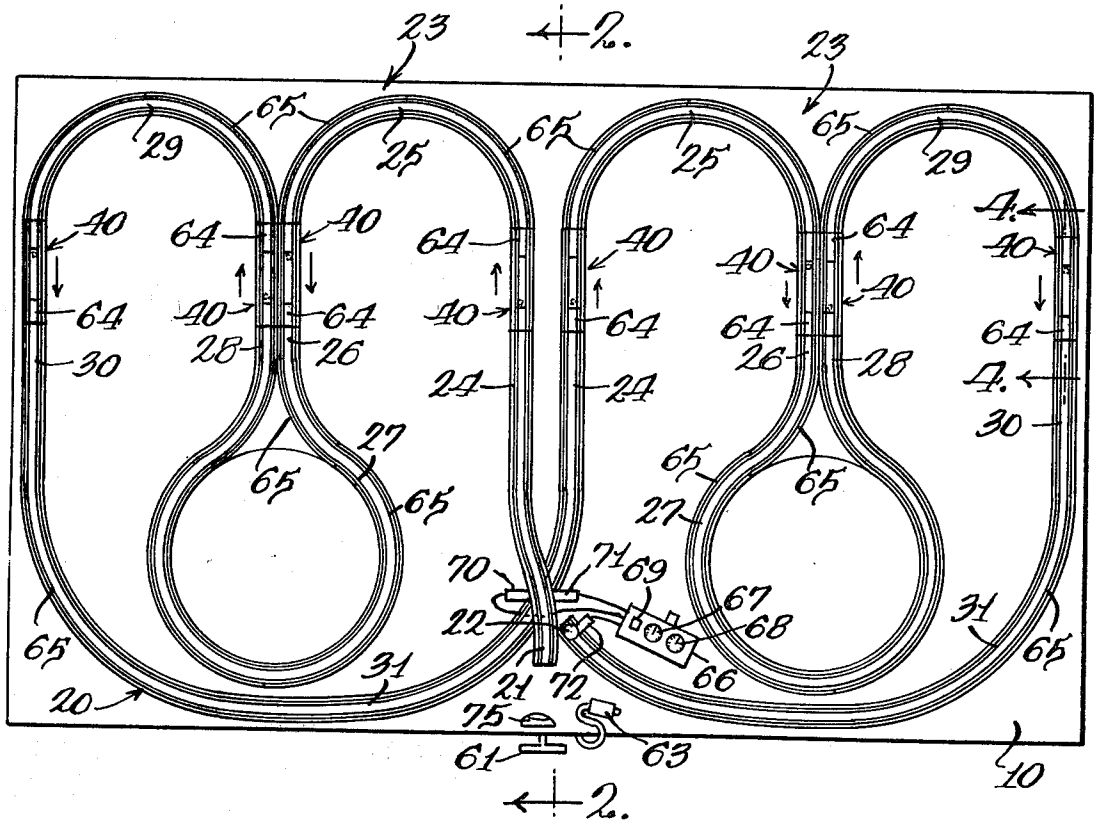
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**ABSTRACT:** Device for testing the effects of hand-eye dominances to aid in analysis of and provide physical therapy for reading and/or psychological problems consequent upon mixed or conflicting dominances, and also playable as a game, comprising an inclined track having a centrally located upper starting point and a pair of substantially identical loop portions to opposite sides of said starting point, a missile such as a ball to be placed on said starting point for gravitational movement downwardly over said track, impelling means on each of said loop portions movable to alter the speed of the missile and means adjacent said starting point for manually actuating said impelling means.

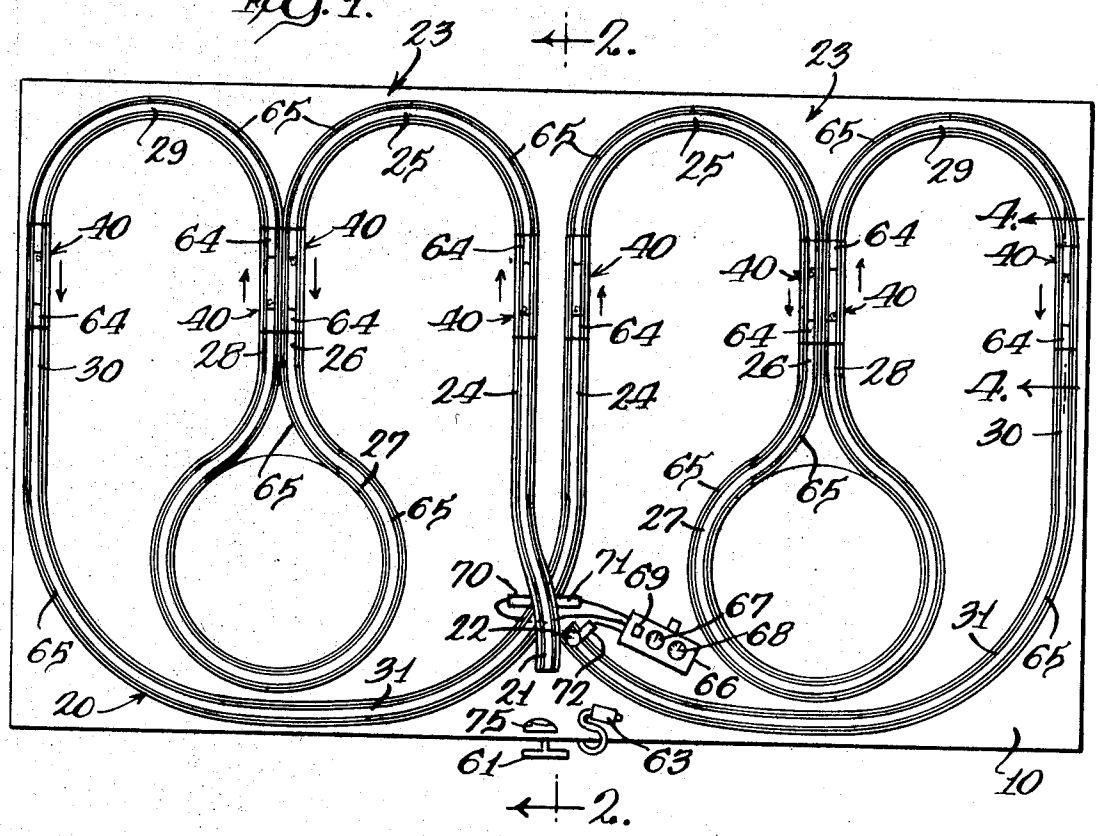



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SHEET 1 OF 2

Fig. 1.



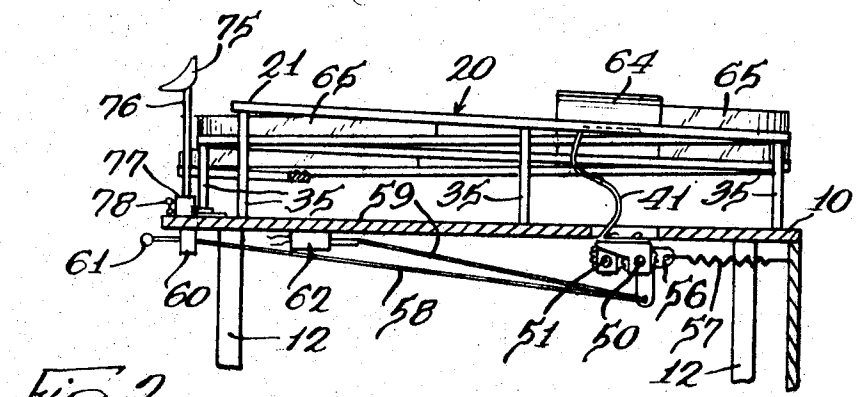




Fig. 2.

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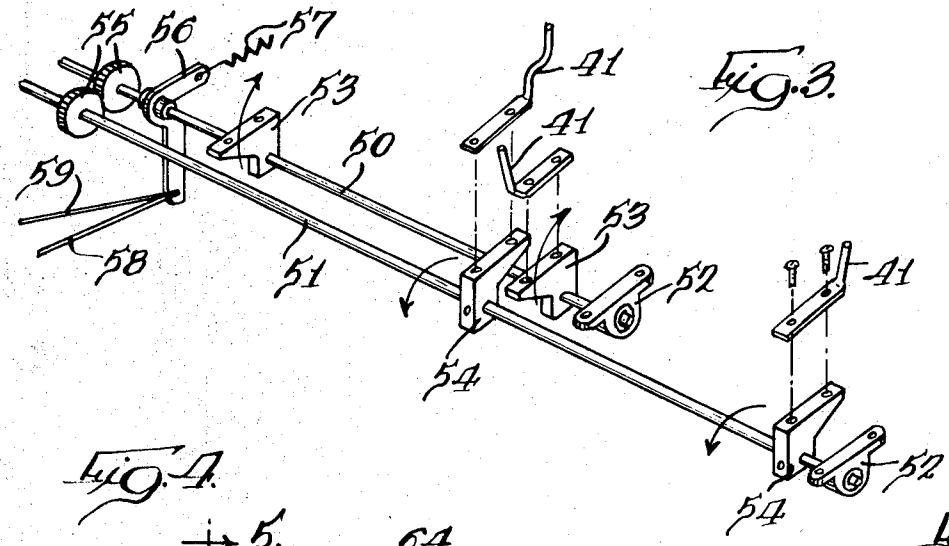



Fig. 3.

Fig. 4.

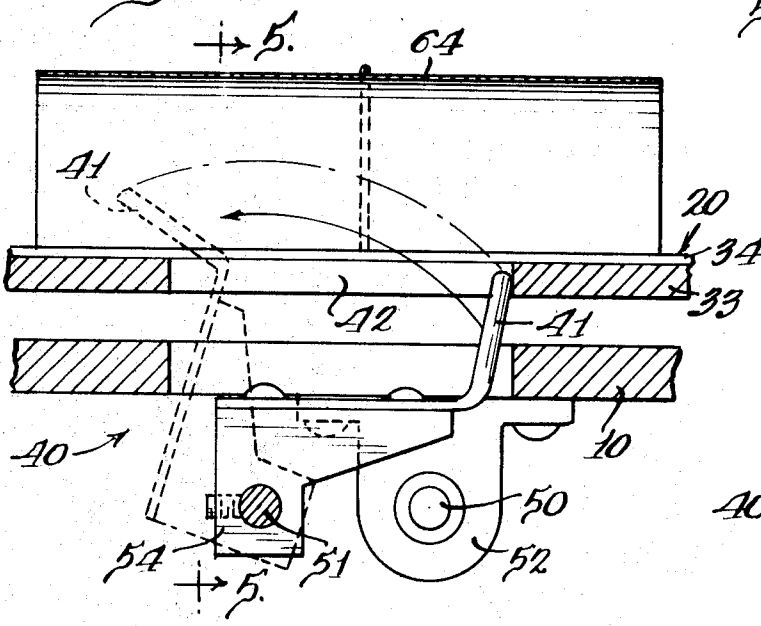



Fig. 5.

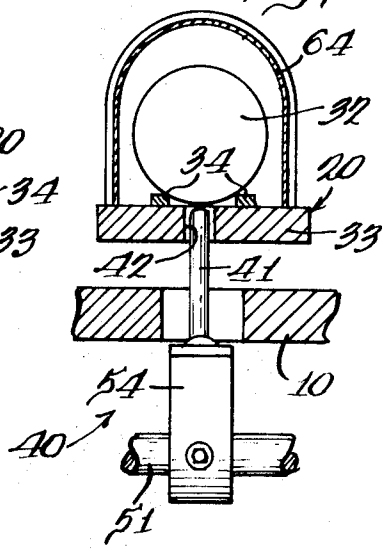
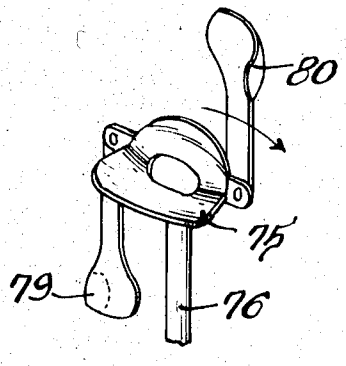



Fig. 6.




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# TESTING DEVICE AND GAME

## BACKGROUND OF THE INVENTION

A theory gaining substantial professional support and acceptance proposes that mixed dominance in humans can be a contributing factor to poor reading ability.

Mixed dominance is principally a matter of the dominant eye and dominant hand being opposed in the sense that one is left, the other right. The details of the theory are somewhat complicated in their neurological aspects; basically, however, mixed dominance involves opposed dominances in the two hemispheres of the brain. For example, a left eye dominance creates a dominant eye activity in the right hemisphere, while a right-hand dominance creates a dominant hand activity in the left hemisphere.

Many persons with mixed dominance are able to cope with this hemispheric conflict so effectively that no reading impediment is even recognizable. On the other hand, certain people with this mixed dominance do not so succeed, with a resultant reading difficulty.

Statistics bear out this theory rather remarkably. For example, in one test group, it was found that of some 360youngsters with reading difficulties 66 percent had mixed dominance as against 20 percent among the population in general.

These brief statements, of course, do no justice to the intricacies and complexities of the problem. This is merely a primitive outline of one basic concept, namely, that mixed dominance can be a negative factor in reading ability.

## SUMMARY OF INVENTION

Manifestly, methods have been devised for determining the eye and hand dominances. The purpose of this invention is to provide an instrument affording a reasonably sensitive test of hand and eye coordination in terms of dominance, i.e., a test of the effect of hand and eye dominances, to reveal the individual's ability or disability to cope with a mixed dominance if one exists and/or to reveal aberrations in cases of both mixed and nonmixed dominances.

A further object is to provide a device as described requiring performance of manual acts involving coordination of eye and hand, and thereby providing means that may, at least in many cases, serve as a mode of physical therapy for individuals having dominance problems.

Inasmuch as the individuals to be tested are primarily children, it is also an object to provide a test instrument that is essentially a game and fun to play.

## THE DRAWINGS

FIG. **1** is a plan view of a preferred embodiment of the testing device;

FIG. **2** is a cross-sectional view thereof taken substantially along line **2–2** of FIG. **1**;

FIG. **3** is an exploded perspective view of one-half of the impelling means for the device of FIG. **1** and the actuating means therefor;

FIG. **4** is a longitudinal section, on an enlarged scale, of one of the impelling means and the adjacent portion of the device, the view being taken substantially on line **4–4** of FIG. **1**;

FIG. **5** is a cross-sectional view taken substantially on line **5–5** of FIG. **4**; and

FIG. **6** is a perspective view of means that may be employed to restrict an individual to use of one eye only during a given test.

## DESCRIPTION

In order to acquaint those skilled in the art with my invention, and the manner of making and using it, I have shown and will now describe the best mode presently contemplated by me of carrying out my invention.

As shown in FIGS. **1** and **2**, my testing device and game is mounted on a base suitably comprising a board or table **10** supported by legs **12**. Mounted on the upper surface of the board is an inclined track **20** having an uppermost starting point **21** located above but in alignment with substantially the midpoint of one side edge of the board **10**, and a lowermost ending point **22** located at substantially the surface of said board below said starting point. Between the points **21** and **22** the track should preferably be such as to accommodate gravitational movement along the entire length thereof of a suitable missile such as a ball or similar object. While the track may undulate up and down for some purposes, I prefer for purposes of dominance testing to have a uniform rate of declivity from the starting point **21** to the ending point **22**.

Between the two points, the track is constructed to provide a pair of loop portions, indicated generally at **23**, disposed to opposite sides of the starting point and both preferably identical i.e., of the same length, configuration and inclination, but of opposite hands. In the preferred embodiment, each loop portion **23** includes a straightaway **24**, a 180° curve **25**, a straight section **26**, a loop **27** of substantially 360° , a straight section **28**, a second 180° curve **29**, a second straightaway **30** and a large terminal curve **31**, the left-hand one of which leads into the opening straightaway **24** of the right-hand loop and the right-hand one of which leads to the ending point **22**.

The track may be constructed in a number of ways depending upon the character of the missile to be employed. In the preferred structure, wherein a small ball or marble **32** is employed as the missile, the track preferably consists of a base **33** and a pair of wall members **34** extending upward a short distance from the base. The walls may serve to confine the ball therebetween, or may serve as tracks on which the ball will ride as is shown in FIG. **5**. Referring to FIG. **2**, the track is supported above the base or table **10** by uprights **35** of progressively decreasing height to mount the track at a uniform rate of declivity, whereby the ball **32** may be rolled down and along the track from starting point **21** to ending point **22** under the influence of gravity in a measurable, constant period of time.

To provide for manually induced variation in the transit time of the ball along the track, each of the straightaways **24** and **30** and each of the straight sections **26** and **28** is equipped with a missile impelling means, indicated generally at **40**. In the case of the ball-type missile **32**, each impelling means **40**, as shown in detail in FIGS. **3** to **5**, is comprised of an extension arm or flipper **41** extending through a complemental slot **42** in the base **33** of the track between the walls **34** thereof, and also extending through an aligned and complemental slot in the base **10**. The flipper has a normal position within the slot **42**, as shown in solid lines in FIG. **4**, so that the ball may pass freely thereover, and is adapted to be moved, preferably arcuately, to a position above the track as shown in dotted lines in FIG. **4**.

The flipper is shaped so as to essentially "throw" the ball along the track upon movement of the flipper from its recessed (solid line) position to its extended (dotted line) position, provided the flipper is sharply moved just at the moment the ball has passed over the upper end of the recessed flipper. If the flipper is actuated later than at this moment, progressively less impetus is imparted to the ball; and if the flipper is not actuated before the ball passes the downstream end of the slot **42**, the flipper does not contact the ball and therefore imparts no impetus to it. On the other hand, if the flipper is moved too soon, i.e., before the ball has passed its upper end, the flipper will stand above the track in the way of the ball and impede rather than enhance its descent over the track.

Due to the tortuous layout of the track, the impelling means **40** in the straightaways **24** and the straight sections **28** must impel the ball in the direction toward the edge of the table **10** opposite the starting point **21**, and the impelling means **40** in the straight sections **26** and the straightaways **30** must impel the ball toward the starting point edge of the table. Thus, the impelling means are of opposite hands, but otherwise identical.

To facilitate manual actuation of the flippers from adjacent the starting point **21**, I prefer to provide a single actuator for

all of the flippers whereby to avoid undue complexity of the actuating means and undue operational complexities for individuals being tested. To this end, I mount a pair of rods or shafts **50** and **51** in spaced parallel relation to one another on the lower surface of the table **10**, the rods or shafts suitably being journaled in bearings such as indicated at **52** in FIG. **3**. The rod **50** carries thereon a plurality of spaced brackets **53** for detachable reception of the flippers **41** provided in the track parts **24** and **28**, and the rod **51** carries thereon similar brackets **54** for detachable reception of the flippers **41** provided in the track parts **26** and **30**. A reverse motion transmission is provided between the two shafts, suitably in the form of a pair of spur gears **55** connected to the respective shafts, whereby rotation of one shaft in the proper direction will automatically cause rotation of the other shaft in the proper direction.

To effect rotation of the shafts, I mount a bellcrank lever **56** on the shaft **50** and connect a spring **57** between one arm of the lever and the base so that the shafts are continually biased to such positions that the flippers **41** are normally recessed within their respective slots **42**. To the other arm of the lever, I connect one or the other or both of a pair of actuating means for pulling on the bellcrank, rotating the shafts and causing ball impelling movement of the flippers simultaneously.

Specifically, I connect a pair of flexible cables **58** and **59** to the bellcrank **56** and bring them forward to adjacent the edge of the table below the starting point **21**. The cable **58** there extends through a guide block **60** and carries on its outer end a handle or grip **61**, whereby the cable **58** may be pulled manually to actuate the flippers simultaneously. The other cable **59** is connected to a solenoid **62** which is under the control of a hand-held switch **63** extended to adjacent the starting point **21**, whereby depression of the switch will also effect actuation of the flippers simultaneously.

The solenoid-operated version of the actuating means affords the advantage, especially in group testing, that the flippers will always be operated at the same speed with the same force, whereby the degree of impetus imparted to the ball, and thus the transit time of the ball over the track, will be strictly a function of eye-hand coordination. The manual pull version of the actuating means brings into play various individual skills in addition to eye-hand coordination, such as quickness and strength, whereby to provide an intelligible reading of the other coordination factors of a given individual, especially in correlation to that individual's performance with the solenoid version. Thus, while either type of actuating means may be used alone, I prefer to equip my device with both.

Due to the sharp blows imparted to the missile by the impelling means **40**, the missile could easily leave the track in the vicinity of any of the impellers and at the corners following the impellers. To prevent this, I provide a ball enclosure or tunnel **64** over each of the flippers **41** and slots **42**, and a shielding wall or tunnel **65** at each of the curves following a flipper. Preferably, these shields are clear and transparent so as not to interfere with observation of the ball or missile.

Consequently, by proper manipulation of the flippers via the cable **58** and handle **61**, or the cable **59** and solenoid **62**, the ball and missile may be impelled along the track at significantly greater speed than that of gravitational descent of the missile over the track. If the flippers are operated somewhat out of perfect phase with the missile, the transit time or speed will lie between that of gravitational descent and optimum flipper operation. If flipper actuation is too late, the transit time will be the same as that of gravitational descent, and if it too early, the transit time can actually be less than that of gravitational descent. Thus, the correlation of the missile transit time attained by an individual relative to the transit time of gravitational descent and the transit times attained by other individuals in his group is a significant indication of coordinative ability.

To measure the transit time of the missile, I prefer to provide an automatic timer **66** capable of measuring (a) total transit time over the whole track and (b) transit time over each of the two loop portions **23**. The timer includes a pair of electric timing clocks **67** and **68**, a master switch **69** for selecting total transit time or individual loop transit times, and three missile actuated switches **70**, **71** and **72** located respectively adjacent the starting pint **21**, the beginning of the right-hand or second loop **23** and the ending pint point **22**.

In use, with the master switch **69** set for individual loop transit times, as the ball or other missile passes and actuates the switch **70**, it starts the electric clock **67**; when the missile passes and actuates the switch **71**, the latter stops the clock **67** and starts the clock **68**; and when the missile reaches the end of the track and actuates switch **72**, the latter stops the clock **68**. When the master switch is in its total time position, the switch **71** is effectively removed from the circuit and the switch **72** is effectively connected to the clock **67** whereby only that clock operates during missile movement from start to finish. The electrical circuits of the timing clocks, and of the solenoid **62**, are conventional in the art and are not described in detail herein.

A further feature of the device assuring uniformity of testing is the provision of means for gently and comfortably locating the head of each person to be tested in a given position relative to the board, i.e. centrally thereof. In the illustrated embodiment, this guide takes the form of a chin rest **75** supported by a rod **76** which is adjustable for height in a block **77** that is mounted on the base of table **10** and equipped with a rod-locking set screw **78**. Additionally as shown in FIG. **6**, this guide is provided with a pair of opaque eye patch members swingably mounted on the chin rest **75** and adapted to be moved selectively to eye covering position to block the individual's view of the track from first one eye and then the other.

The mode of use of the device for purpose of dominance testing comprises the sequence of steps of first placing the ball **32** or other missile on the starting point **21**, releasing it for gravitational descent along the track without an operator present, and measuring the transit time of the missile over the track, either total transit time and/or the transit times for each of the two loops **23**. Each person to be tested, following a period of acquaintanceship with the device, is then instructed to hold the selected operator **61** or **63** in a given hand, to rest this chin on the guide **75**, to view the track with either one or both eyes (with the aid of the eye patches **79**, **80**) and to use the hand-held operator to actuate the flippers in an effort to impel the missile over the track as fast as possible. Each individual is tested, by measurement of transit time, for each of the following six conditions:

A. Both eyes and the right hand.
B. both eyes and the left hand.
C. The right eye and the right hand.
D. The right eye and the left hand.
E. The left eye and the right hand.
F. The left hand and the left eye.

A comparison of the transit times of the six test to the basic gravitational descent time, to one another, and to the corresponding test times of other individuals in a selected group will afford the psychologist and/or reading therapist meaningful information for analysis and treatment of those troubled by mixed and/or confused dominances.

The device may also be used as a therapeutic tool to give physical exercise to those plagued with ill effects from mixed or confused dominances, and to help them train themselves to better cope with their individual phenomenon.

Finally, of course, the device may be used as a game played by one or any number of persons under any set of rules selected by them. The purposes of this invention have thus been shown to be attained in a convenient, practical, economical and entertaining manner.

While I have shown and described what I regard to be the preferred embodiment of my invention, it is to be appreciated that various changes, rearrangements and modifications may be made therein without departing from the scope of the invention, as defined by the appended claims.

I claim:

1. A device for testing hand-eye dominances, comprising a track including an upper centrally located starting point, a lower centrally located ending point and a pair of substantially identical loop portions between said points disposed to opposite sides of said starting point, a missile adapted to be placed on said starting point and to move gravitationally downward along said track to said ending point, impelling means on each of said loop portions in substantially identical locations thereon, said impelling means being adapted to be actuated when the missile is in the vicinity thereof for altering the speed of said missile, hand operated means adjacent said starting point for manually actuating said impelling means whereby the device provides substantially identical test spheres to opposite sides of an operator positioned at said starting point for testing for hand-eye dominances of the operator.

2. A device as set forth in claim 1, said loop portions comprising tortuous paths and said track being uniformly inclined from said starting point to said ending point.

3. A device as set forth in claim 1, including means for locating the head of the operator centrally of the device adjacent said starting point, and means for blocking the operator's view of the track from first one eye and then the other.

4. A device as set forth in claim 1, said actuating means comprising a single handle for physically moving all the impelling means simultaneously.

5. A device as set forth in claim 1, said actuating means comprising a solenoid for moving all the impelling means simultaneously and a hand operated switch for energizing said solenoid.

6. A device as set forth in claim 1, said loop portions each including parts guiding the missile for movement in opposite directions, said impelling means including impellers for impelling the missile in said opposite directions along the respective parts of each of said loop portions, said actuating means including a first common actuating bar for all of the impellers operable in one direction, a second common actuating bar for all of the impellers operable in the opposite direction, reverse motion transmitting means between said bars and a single actuator adjacent the center of the device connected to one of said bars for operating both of said bars and all of said impellers simultaneously



7. A process for testing individuals for hand-eye dominances comprising the steps of placing a missile on an inclined track having an upper central starting point, a pair of substantially identical loop portions to opposite sides of said starting point, and a lower central ending point, measuring the transit time of the gravitational descent of said missile from said starting point to said ending point, directing an individual to stand centrally of said track adjacent said starting point and from said point to actuate by hand missile impelling means on the track as the missile passes in the vicinity of each such means, again placing the missile on said starting point, and measuring the transit time of the descent of said missile from said starting point to said ending point as modified by the individual's actuation of said impelling means, whereby to provide data for determination by reference to the measured times of the degree of coordination between the individual's visual observation of the missile as it descends along said track and the individual's hand operation of said impelling means as the missile passes in the vicinity of said impelling means.

8. A process as set forth in claim 7, comprising repeating the last two enumerated steps for each of the following conditions of visual observation of the track and hand operation of the impelling means:

A. Both eyes and the right hand,
B. Both eyes and the left hand,
C. Right eye and right hand,
D. Right eye and left hand,
E. Left eye and right hand,
F. Left hand and left eye;

whereby to provide data for determination of the individual's degree of coordination between eye and hand for each of said conditions and for determining therefrom the possibility of mixed or conflicting hand-eye dominances.